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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/845,356	05/01/2001	Masayuki Mishima	Q64324	2603

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EXAMINER	
YAMNITZKY, MARIE ROSE	

ART UNIT	PAPER NUMBER
1774	

DATE MAILED: 12/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/845,356	MISHIMA, MASAYUKI	
	Examiner	Art Unit	
	Marie R. Yamnitzky	1774	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *25-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *25-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. A request for continued examination under 37 CFR 1.114 was filed in this application after a decision by the Board of Patent Appeals and Interferences, but before the filing of a Notice of Appeal to the Court of Appeals for the Federal Circuit or the commencement of a civil action. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's amendment filed on September 28, 2006, which amends claims 25 and 29-32, has been entered.

Claims 25-32 are pending.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 25-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baldo et al. in *Appl. Phys. Lett.* 75(1), pp. 4-6 (July 5, 1999) or Forrest et al. (US 6,310,360 B1), either reference in view of Egusa et al. (US 5,294,810).

Baldo et al. disclose light-emitting devices comprising a glass substrate, an anode, an organic compound layer including a light-emitting layer containing two light emitting materials, and a cathode. See the whole reference. In various devices, the light-emitting layer contains

$Ir(ppy)_3$ and CBP. Baldo et al. also disclose a device in which the light-emitting layer contains $Ir(ppy)_3$ and Alq_3.

Forrest et al. disclose light-emitting devices comprising a glass substrate, an anode, an organic compound layer including a light-emitting layer/zone containing three light emitting materials, and a cathode. See the entire patent to Forrest et al. In particular, see Fig. 1, Fig. 3, column 9, line 1 - c. 11, l. 60, c. 12, l. 58 - c. 13, l. 50, c. 14, l. 63 - c. 15, l. 17 and c. 17, l. 9 - c. 19, l. 19. Note that c. 11, l. 57 contains an error in that λ for $Ir(ppy)_3$ should read --~500 nm-- rather than "~400 nm". In Forrest's Example 1, the light-emitting layer consists of an alternating series of layers of CBP doped with $Ir(ppy)_3$ and CBP doped with DCM2.

"CBP" stands for 4,4'-N,N'-dicarbazole-biphenyl, which is a blue light-emitting material having a light-emitting wavelength peak of about 400 nm.

"$Ir(ppy)_3$" stands for *fac* tris(2-phenylpyridine) iridium, which is a green light-emitting orthometallated complex of iridium having a light-emitting wavelength peak of about 500 nm.

"Alq_3" stands for tris-(8-hydroxyquinoline) aluminum, which is a green light-emitting material.

"DCM2" is the abbreviation for a pyran compound that is a red light-emitting compound having a light-emitting wavelength peak of about 590 nm (the full name is given at c. 4, l. 56-58 and the formula is shown at the bottom of c. 9 of the patent to Forrest et al.).

Baldo et al. or Forrest et al. disclose devices comprising more than one light-emitting material, each of the materials capable of emitting light of a different color, wherein one of the materials is an orthometallated complex. In Baldo's device comprising CBP doped with

$Ir(ppy)_3$, a single light-emitting layer contains green and blue light-emitting materials. In Forrest's device of Example 1, green and blue-light emitting materials are contained in one light-emitting layer while red and blue-light emitting materials are contained in a second light-emitting layer.

The prior art devices of Baldo et al. or Forrest et al. do not have red, green and blue light-emitting materials mixed in a single layer as required by claims 25-28, and do not have separate red, green and blue light emitting layers as required by claims 29-32. The prior art devices of Baldo et al. or Forrest et al. do not emit white light as required by the present claims.

Further, in the devices of Baldo et al. or Forrest et al., the light-emitting layer(s) only comprise(s) one orthometallated complex rather than at least two as required by present claims 26 and 30, or at least three as required by present claims 27 and 31.

It was known in the art at the time of the invention that the color of light emitted by a light-emitting device can be controlled by the selection of light-emitting materials used in the device, and that emission of white light can be achieved by providing an appropriate combination of light-emitting materials.

Egusa et al. disclose light-emitting devices, teach that a light-emitting device may comprise more than one light-emitting layer (e.g. see column 11, line 40 - c. 12, l. 60 and c. 19, l. 52 - c. 20, l. 61), teach that different light-emitting materials may be mixed in a light-emitting layer in order to control light-emission wavelength and that the mixture may include a phosphorescent material emitting light from a triplet excited state (e.g. see c. 25, l. 36 - c. 27, l. 15), and teach that it is possible to achieve emission of white light from a device comprising

multiple light-emitting layers and from a device comprising a mixture of light-emitting materials (e.g. see c. 20, l. 57-61 and c. 26, l. 15-28).

It would have been an obvious modification to one of ordinary skill in the art at the time of the invention to provide light-emitting devices similar to those disclosed by Baldo et al. or Forrest et al. but utilizing different and/or additional light-emitting materials in combination with the iridium complex either in the same layer or in a light-emitting layer separate from the layer comprising the iridium complex. One of ordinary skill in the art would have been motivated to utilize different and/or additional light-emitting materials in combination with the iridium complex so as to provide a device having the advantages of using a phosphorescent material as taught by Baldo et al. or Forrest et al. while at the same time being able to modify the color of light emitted by the device as taught by Egusa et al. It would have been within the level of ordinary skill of a worker in the art at the time of the invention, as a matter of routine experimentation, to determine suitable and optimum combinations of light-emitting materials selected from known light-emitting materials so as to obtain a functional device capable of emitting light of the color(s) desired. One of ordinary skill in the art would have been motivated to select a combination of light-emitting materials capable of providing white light when the light-emitting device was intended to be used for an application where white light was desirable.

With respect to claims 28 and 32, one of ordinary skill in the art at the time of the invention would have recognized that in order to provide a white light emitting device as taught by Egusa et al., a device would have to be provided with two or more light-emitting materials that emit light when an electric field is applied across the electrodes of the device.

With respect to the requirement for more than one orthometallated complexes as in claims 26, 27, 30 and 31, Baldo et al. or Forrest et al. disclose an orthometallated complex that is a green light-emitting material, and orthometallated complexes that emit blue or that emit red are known. The selection of suitable and optimum combinations of red, green and blue light-emitting materials from known materials in order to achieve white light would have been within the level of ordinary skill of a worker in the art at the time of the invention as a matter of routine experimentation.

4. Applicant's arguments filed September 28, 2006 have been fully considered but they are not persuasive.

With respect to Baldo et al. in view of Egusa et al., applicant argues that Baldo et al. teach that blue emission from CBP is negligible and therefore CBP is not a blue light-emitting material in Baldo's device. Applicant argues that even if one of ordinary skill in the art were motivated to add a red light-emitting material to Baldo's device, the device would not emit white light.

Applicant argues that the present claims require that the light-emitting layer "consists essentially of" red, green and blue light-emitting materials "to obtain the white light emission".

Applicant further argues that neither Baldo et al. nor Egusa et al. disclose or suggest that two or all of the light-emitting materials be orthometallated complexes.

With respect to Forrest et al. in view of Egusa et al., applicant argues that in Forrest et al., $Ir(ppy)_3$ acts as a sensitizer rather than as a green light-emission material. Applicant argues that

even if one of ordinary skill in the art were motivated to add other light-emitting materials to Forrest's device, the device would not be a device according to the present invention having at least one orthometallated complex as a light-emitting material and that obtains white light emission.

Applicant indicates that the claim amendments made in the amendment filed September 28, 2006 are made in response to the Board Decision mailed July 28, 2006.

The examiner notes that the amended claim language of "consists essentially of" and "consisting essentially of" does not exclude the addition of other materials to the light-emitting layer(s). These phrases only exclude materials that materially affect the basic and novel characteristics of the claimed invention. It is the examiner's position that these phrases do not exclude materials which function as binders, sensitizers, hosts, or provide other auxiliary functions known in the art such as charge-transportation, from the light-emitting layer(s). The present claim language also does not exclude the use of multiple light-emitting materials for each color.

Each of the primary references and the secondary reference pertains to organic EL devices and each discloses that multiple light-emitting materials may be used in combination in an organic EL device. The primary references establish that an orthometallated complex as required by the present claims was known in the art at the time of the invention to be a suitable light-emitting material for an organic EL device. The secondary reference establishes that it was known in the art at the time of the invention that organic EL devices that emit white light can be obtained by selecting an appropriate combination of light-emitting materials, including

combinations of red, green and blue light-emitting materials. The secondary reference also establishes that it was known in the art at the time of the invention that materials exhibiting phosphorescent emission can be used in a mixture of light-emitting materials when making an organic EL device. The orthometallated complex used in the primary references exhibits phosphorescent emission.

The secondary reference provides motivation to use red, green and blue light-emitting materials in order to provide a device capable of emitting white light, and either of the primary references provides motivation to use an orthometallated complex as a light-emitting material. It is the examiner's position that the motivation to combine the references lies in the advantages to be attained by the use of an orthometallated iridium complex as taught by either primary reference while being able to modify the color of light emitted from the device as taught by the secondary reference.

One of ordinary skill in the art at the time of the invention would have recognized the value of devices emitting colors other than those specifically taught by Baldo and Forrest, and the fundamental concept of altering the color emitted light by providing combination of different light-emitting materials was known in the art at the time of the invention as evidenced by the teachings of Egusa et al.

One motivated to provide a white light-emitting device having advantages obtained by the use of a phosphorescent material as taught by Baldo et al. would merely have to select appropriate additional light-emitting materials to be combined with the materials used by Baldo et al. While the emission from CBP is minimal in Baldo's device, one of ordinary skill in the art

at the time of the invention would be motivated to add, for example, an additional material capable of emitting blue light and an additional material capable of emitting red light in sufficient relative quantities to control the light-emission intensities of the various light-emitting materials in the device so as to provide white light emission.

Likewise, one motivated to provide a white light emitting device having the advantages obtained by the use of a phosphorescent material as taught by Forrest et al. would be motivated to add, for example, an additional material capable of emitting blue light and an additional material capable of emitting green light in sufficient relative quantities to control the light-emission intensities of the various light-emitting materials in the device so as to provide white light emission. While applicant argues that $Ir(ppy)_3$ acts as a sensitizer rather than as a green light-emission material in the device of Forrest et al., the examiner notes that emission from $Ir(ppy)_3$ does contribute to the emission spectrum provided by the device as shown in Fig. 3. The first full paragraph in column 14 also teaches that some photons are emitted by $Ir(ppy)_3$ in the device.

5. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY
December 08, 2006

Marie R. Yamnitzky

MARIE YAMNITZKY
PRIMARY EXAMINER

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